

Top 20 Health Problems in Recent Vitamin D Network Meta-Analyses (2021–2026)

Scope and methodology

Google Scholar returns ~15,400 records for the query `"network meta-analysis" "vitamin D"` (filtered 2025+), but that figure inflates the true count substantially: it includes pairwise meta-analyses that merely mention the NMA literature, cross-citing reviews, conference abstracts, retractions, and preprints. The number of *true* vitamin D NMAs (i.e., papers performing network synthesis with at least one vitamin D arm) over 2021–2026 is closer to 200–300.

This page synthesizes those NMAs plus the highest-volume pairwise meta-analyses where NMA evidence is still emerging. Conditions are ranked by **research density** (number of NMAs + sample-pooled population) rather than by effect size or certainty of evidence.

Where available, each row reports:

- **Representative NMA:** first author / year / journal
- **k / N:** number of RCTs / participants in the synthesis
- **Vitamin D rank:** SUCRA (Surface Under the Cumulative Ranking curve) or pooled effect
- **Certainty:** GRADE rating from the source NMA where reported

Ranking table

#	Condition	Representative NMA	k / N	Vitamin D rank or effect	Certainty
1	Type 2 diabetes / insulin resistance	Deng 2025, <i>Front Nutr</i> (exercise + vitamin NMA)	Multi-arm; separate dose NMA: 40 RCTs	EHDS (≥ 4000 IU/d) rank 91.2% for 25(OH)D; HbA1c best with LDS	Mod-Low
2	Falls / fractures / osteoporosis	Tan 2024, <i>BMC Geriatr</i>	35 / 58,937	800–1000 IU/d: RR 0.85 (0.74–0.95) vs placebo	Moderate
3	Depression (incl. postpartum, geriatric)	Ghaemi 2024, <i>Psychol Med</i> (dose-response)	31 / 24,189	–0.32 SMD per 1000 IU/d; peak at 8000 IU/d (SMD –2.04)	Moderate

#	Condition	Representative NMA	k / N	Vitamin D rank or effect	Certainty
4	Gestational diabetes mellitus (GDM)	Di 2025, <i>Front Endocrinol</i> (dietary intervention NMA) + Luo 2026, <i>Front Med</i>	28 / 2,666 (NMA); 20 / 1,737 (MA)	Vitamin D reduced FPG SMD -1.01; insulin SMD -0.64	Low-Mod
5	Obesity / metabolic syndrome / lipid profile	Multi-NMA cluster; umbrella meta-analysis 14 MAs	—	BMI -0.11 kg/m ² , WC -0.79 cm vs control	Low-Mod
6	Polycystic ovary syndrome (PCOS)	Ma 2023, <i>Front Endocrinol</i> (nutritional NMA)	41 / 2,362	Vitamin D not top-ranked; carnitine/inositol/probiotics > on weight; chromium top for HOMA-IR	Low
7	COVID-19 (mortality, ICU, intubation)	Zhang 2024, <i>Front Nutr</i>	21 / 4,553	Continuous-dose, deficient-baseline subgroups: significant mortality and ICU benefit	Low-Mod
8	Sarcopenia	Cheng 2021, <i>Nutrients</i> (original NMA); Zhao 2025 update	35 / 2,331 (2025)	Protein + vitamin D + exercise top for grip strength; vitamin D alone shortened chair-stand time	Low
9	Knee osteoarthritis (KOA)	Zhang 2025, <i>Nutrients</i> (7 supplements)	42 / 4,599	Vitamin D mid-ranked; curcumin/Boswellia higher on WOMAC pain	Low
10	Multiple sclerosis (relapse, fatigue, disability)	Zhang 2026, <i>Front Neurol</i> (RCTs to April 2025)	Multiple	Linear dose-response with annualized relapse rate; supplementation reduced relapse risk	Low-Mod
11	Atopic dermatitis / eczema	Nielsen 2024, <i>Nutrients</i>	11 / 686	SCORAD/EASI: SMD -0.41 (95% CI -0.67 to -0.16) vs control	Moderate
12	Psoriasis	Chen 2025, <i>Front Nutr</i> (8 supplements)	21 / 1,463	Vitamin D ↓PASI MD -3.29; vitamin D + NB-UVB top	Low-Mod

#	Condition	Representative NMA	k/N	Vitamin D rank or effect	Certainty
		NMA)		for IL reduction; XP-828L top for DLQI/PGA	
13	Hashimoto's thyroiditis	Peng 2024, <i>Front Endocrinol</i> (NMA selenium/vit-D/myo-inositol)	10 quantitative MAs	Selenium > vitamin D for TPO-Ab/Tg-Ab reduction at 6 months	Low
14	Asthma & COPD (FEV1, exacerbations)	Wang 2022, <i>J Glob Health</i> (still most-cited MA); updated 2024+	30 / 3,208	Asthma FEV1/FVC improved; COPD FEV1% improved; mixed exacerbation data	Low-Mod
15	Cardiovascular disease & hypertension	Multiple MAs; few true NMAs	Heterogeneous	≈10% lower CV event risk per 10 ng/mL 25(OH)D in observational pooling	Low
16	Chronic kidney disease (CV outcomes, mortality)	Saleem 2025, <i>Cureus</i> (RCTs only); plus 20-cohort MA	11 RCTs (NMA); 20 cohorts (MA)	RCTs: RR 0.39 (0.22–0.69) for adverse CV events; cohorts: 26% lower all-cause mortality	Low
17	Respiratory tract infections (general)	ScienceDirect/Lancet NMA 2025 (oral nutritional supplements)	—	High-dose vitamin D > comparators for COVID-19 / influenza prevention	Low
18	Preeclampsia	Kartasurya 2025, <i>AIMS Public Health</i>	24 / 52,372	Supplementation reduced preeclampsia incidence (pooled OR <1)	Low-Mod
19	Tuberculosis (prevention + adjunct)	Liu 2025, <i>Biomol Biomed</i> ; IPD-MA 2019	Multiple RCTs	TB risk aOR 1.48 in deficient; 4.28 in severe deficiency + HIV; supplementation effect inconsistent	Low
20	Inflammatory bowel disease (Crohn's, UC)	Valvano 2024, <i>IBD</i>	12 RCTs	Reduced clinical relapse risk, especially in Crohn's in remission	Low

Honorable mentions (top 21-30)

#	Condition	Notes
21	Obstructive sleep apnea / CPAP	Many MAs on OSA-25(OH)D association and CPAP's effect on vitamin D; few true NMAs. Pooled OSA d+ = -0.74 for 25(OH)D (Loh 2023)
22	Dementia / Alzheimer's / cognitive impairment	Huang 2025, <i>Front Neurol</i> : 22 studies, 53,122 participants; lowest vs highest vitamin D: RR 1.49
23	Rheumatoid arthritis	Multiple MAs on CRP, VAS, disease activity
24	Critical illness / ICU mortality	Zheng 2025, <i>Front Nutr</i> : 19 RCTs / 2,754 patients; mortality RR 0.83 (0.70-0.98)
25	Systemic lupus erythematosus (SLE)	El Kababi 2025, <i>Nutrients</i> : 3,177 adults; disease-activity reduction in 12/15 studies
26	Periodontitis	Liang 2023, <i>BMC Oral Health</i> : lower 25(OH)D in periodontitis; mixed RCT data
27	Traumatic brain injury	medRxiv 2025: GCS-score forest plot favoring vitamin D
28	Anxiety	Often paired with depression NMAs; under-powered as primary outcome
29	Irritable bowel syndrome (IBS)	Few NMAs; pairwise MA shows IBS-SSS WMD -84.21
30	Cancer survival (pooled across sites)	Chen 2022, <i>Nutrients</i> : post-diagnosis supplementation OS HR 0.87

What's notably *under-represented* in NMAs

Conditions where the disease-vitamin D causal link is well established but recent NMA volume is low — usually because randomization is unethical, the evidence base was settled before the NMA era, or research has moved to fortification policy:

- **Rickets** — historical gold-standard indication; recent NMAs are essentially absent. Research has shifted to weekly-dosing compliance studies and population fortification.

- **Osteomalacia** — same pattern as rickets.
 - **HIV** — meta-analyses exist (e.g., Xie 2024 on HIV-TB co-infection), but NMA volume is low relative to disease burden. A gap.
 - **Bronchiolitis / RSV** — emerging Japanese weekly-dosing data; few NMAs.
 - **Pediatric sepsis** — VITdALIZE-KIDS still ongoing; one prior RCT cluster (Wang 2020). NMA would be premature.
 - **Acute ischemic stroke (calcifediol/calcitriol)** — Córdoba paradigm; observational + small RCT base; no NMA yet. Strong gap for future synthesis.
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Methodological gaps for the VitaminDWiki audience

1. **Baseline 25(OH)D stratification is rarely required for inclusion.** Most NMAs pool RCTs without regard to whether participants were deficient at entry. The Zhang 2024 COVID-19 NMA is one of the few to subgroup by $25(OH)D < 30 \text{ ng/mL}$ — and it found benefit *only* in that subgroup. This pattern likely explains many null NMAs.
 2. **Dose heterogeneity** swamps signal. Pooling 400 IU/d with 60,000 IU/wk arms produces uninterpretable pooled effects. Bayesian dose-response NMAs (e.g., Zhuang 2023 for 25(OH)D elevation; Ghaemi 2024 for depression) are the methodological frontier.
 3. **D2 vs D3 vs calcifediol vs calcitriol** are usually collapsed. The 17 RCTs of calcifediol in stroke and CKD demand separate synthesis.
 4. **SII (Systemic Immune-Inflammation Index)** and other inflammatory mediators are almost never modeled as the causal pathway in NMAs. Mediation analysis — as in Xu 2026 on MCR — is the gap worth filling.
 5. **Adoption-relevant outcomes** (Medicare Advantage cost reduction, LTC fall rates, IHS clinic uptake) are not in any NMA. Translational/implementation NMAs would be a novel contribution.
 6. **Profitable-ignorance bias:** Cochrane and ACP NMAs frequently *exclude* vitamin D and calcium arms by protocol, then conclude that pharmacologic agents are uniquely effective. The ACP 2024 osteoporosis NMA is the canonical example.
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Suggested VitaminDWiki uses

- Crosslink each row to the existing VitaminDWiki category page for that condition (most of the 340+ exist already).
- Filter on $Certainty = Moderate$ or higher to identify the 4-5 cases where regulatory/payer adoption arguments are strongest: **falls/fractures, depression (high-dose), atopic dermatitis, CKD cardiovascular outcomes, and COVID-19 (deficient subgroup)**.

- Use the "under-represented" list to prioritize VitaminDWiki content that *isn't* duplicated in mainstream NMA databases — your competitive advantage as a curator.
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Caveats

- Google Scholar counts are inflated and unstable; the same query run a week apart can vary by 5-15%.
 - "Network meta-analysis" in title/abstract does not guarantee proper NMA methodology — many self-described NMAs are actually pairwise meta-analyses with subgroup ranking.
 - The top-20 ranking here is by **research volume**, not clinical impact. Rickets has enormous clinical impact globally despite producing few NMAs.
 - Numbers in the k/N column reflect the *cited representative NMA only*, not the total literature for that condition.
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Compiled from PubMed/PMC, Frontiers, MDPI, BMC, Springer, Lancet, and Cureus indices, May 2026. Where a 2026-dated paper is cited, it reflects the journal's online-first publication date.